Audio Distribution ◆►

Arenas and Stadiums • Casinos and Gaming • Restaurants and Retail

►SymNet™ | Network Audio Solutions

Engineered by ◑ Symetrix

▶ **SymNet**™ | Network Audio Solutions

Contents

Arenas and Stadiums • Casinos and Gaming • Restaurants and Retail

Introduction

Audio Distribution systems are the backbone of any hospitality or entertainment venue including casinos, restaurants, hotels, retail spaces, and sports arenas. Their purpose is to distribute audio to various zones (areas or rooms) throughout the facility. Audio content typically consists of **background music (BGM), paging**, **or other audio sources** such as a sports announcer, advertisements, or jingles. Thus, the purpose of an audio distribution system is often two fold: to provide ambience and to provide information. **Noise masking** systems used in office environments are another example of a more specialized audio distribution system that's purpose is to provide a level of privacy in an open floor plan.

SymNet™ Audio Distribution systems are the most powerful and flexible, yet easiest to use in the industry. Its toolkit contains all of the desired modules for any routing situation, from **selectors** and **distributors** to **matrix mixers** and **priority-driven routers**. The **flexible bussing architecture** handles a range of systems, from those requiring a large centralized I/O schema, to systems requiring smaller clumps of distributed I/O – to anything in between. **User control** may be tailored specifically for the client using intuitive wall panels with tactile buttons, knobs and customized text menus.

Overview

Picture a small restaurant with a dining area, a bar, a lobby and a seating area outside the building to accommodate waiting guests. Each area is considered a zone. Microphones and a collection of background music sources connect to the SymNet system, which shapes and routes the signals to the zones.

"Fritz, party of four, your table is ready..." The staff needs a paging system to make announcements into particular areas. The paging system usually shares the speakers with the music system. The announcements "duck" or reduce the volume of the audio currently playing in the zone so the announcement is heard clearly, and of course, SymNet does this automatically.

Now imagine the restaurant is filling up with customers and a low roar fills the room. Through SymNet technology, the music and the paging audio are still audible over the crowd as if someone turned up the volume to compensate. But these audio systems typically operate hands-free with minimal amount of human interaction. Often, **wall panels** are installed throughout the facility to provide simple adjustments when necessary, but is someone really standing by and adjusting the audio level whenever the room fills or empties? The short answer is, no. The adjustment is made automatically by the SymNet system.

SymNet Technologies for Audio Distribution

As mentioned earlier, SymNet's toolkit has a full complement of **routing, mixing and matrixing modules**. However, several of its audio processing modules are of particular use in audio distribution systems.

AGC (Automatic Gain Control) modules are invaluable for controlling the sometimes wildly varying levels of background music sources. The **British EQ** combines the most popular filters and equalization used in microphone processing. When combined with a **Compressor/Limiter**, triggering a **Ducker**, you'll have a foolproof paging signal chain that simply sounds great.

In certain situations an audio distribution system must perform tasks at specific times. SymNet accommodates this by scheduling a preset recall on a calendar. Using the **Event Scheduler** in SymNet Designer, the integrator can setup any stored preset to be recalled at a specified time. Recurring, or exclusive, special events are easily accomplished as well.

By far the most invaluable and unique process SymNet has to contribute to the performance of audio distribution systems are the **SPL Computer modules**. Their discussion follows as the featured technology for this application.

❥ SPL Computer Modules
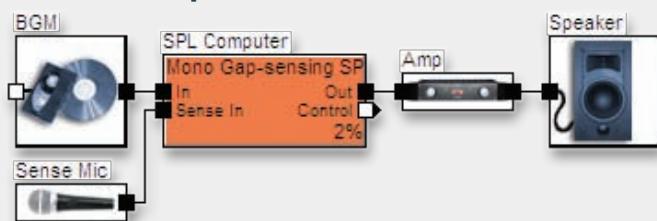
SymNet SPL Computer Diagram

Sometimes referred to as **Ambient Noise Compensation** modules, **SPL Computers** use a microphone to sense the level of ambient (crowd) noise in a room, then automatically adjust the volume of the sound system within predetermined parameters. Following the success of its stand alone SPL Computers (the 571/572 and 371/372), Symetrix has incorporated the technology into SymNet by developing SPL Computer DSP modules for SymNet Designer.

A sensing microphone is mounted in the zone to monitor the ambient noise level within that zone. Typically, one SPL Computer and microphone are required for each zone where ambient noise compensation is desired.

As more people are added to the zone the room volume increases; the SPL Computer module turns up the volume within the zone to maintain the proper balance of ambient noise and sound system volume. As the room empties (reducing the ambient noise level), the SPL Computer turns the sound system down to an appropriate level. In SymNet Designer, there are two types of SPL Computer modules: **'Gap Sensing'** and **'Continuous'**. Both types use a microphone to monitor the ambient level in the room, but they differ in how they perform the measurement.

❥ SPL Computer Modules: Gap-sensing
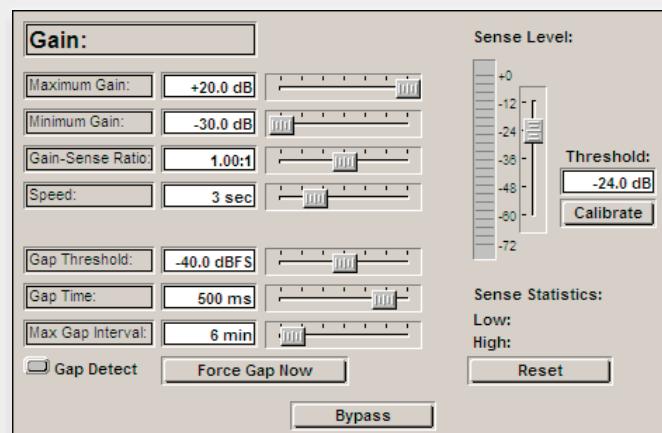
SymNet Gap-sensing SPL Computer module

To take a measurement of the ambient noise, the Gap-sensing SPL Computer either waits for the audio playing in the zone to stop or fall below a certain threshold. Once the audio has fallen beneath the threshold, the SPL Computer mutes the zone audio and takes a reading of the room. Based on the measured level, the volume is adjusted then the audio is un-muted. The level in the zone will then be appropriate. If there are no gaps in the audio, the system will momentarily mute the audio at specified intervals to take its reading.

This type of SPL Computer module often produces better results than a continuously sensing version as it does not have to extrapolate its own output from the ambient noise. Therefore, it can be more accurate and predictable in certain situations as well as more forgiving to non-

ideal setup. However, it may not be the most suitable for situations requiring constant background program material as the module does require a break in program material to take its sense readings, or it must interrupt the program material briefly.

❧ SPL Computer Modules: Continuous
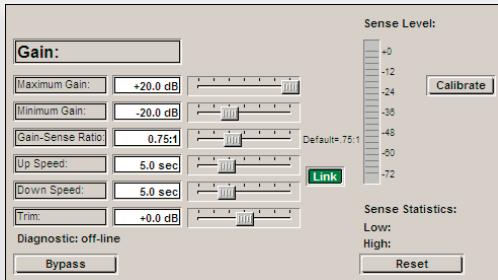
As the name suggests, the **Continuous SPL Computer** is reading the ambient noise in the zone at all times and making adjustments immediately, as necessary. This makes the setup of a Continuous SPL Computer a bit more complex than the Gap-sensing version. Because the SPL Computer is continuously monitoring, or listening, to the noise level in the room, it will also be measuring some of the audio from the sound system. The SPL Computer must "remove" the system audio from its measurement to ac-curately measure only the ambient noise. This requires the SPL Computer to be calibrated. Once the SPL Computer has been calibrated, it can essentially ignore the system audio, allowing it to continuously adjust the level of the sound system.

The Continuous SPL Computer does require a little more care to implement. Some consideration must be made towards microphone type, microphone and speaker place-ment, DSP design (signal flow), and gain staging before and after the SPL Computer module. The details of imple-mentation, and much more, are fully documented within SymNet Designer's expansive **help file**.

Site File Configuration View

Audio Distribution
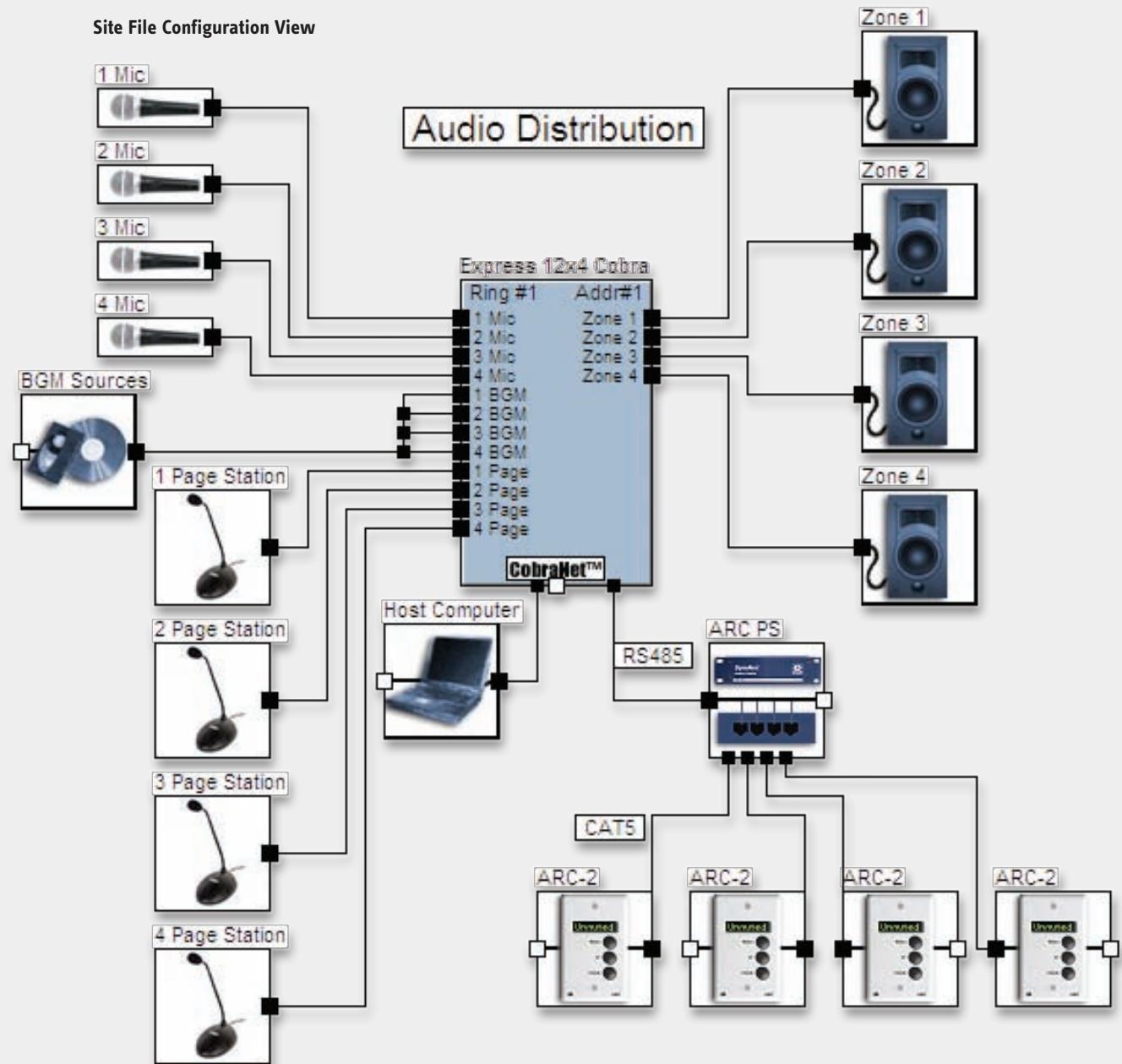
● SymNet Design for Audio Distribution

We are going to explore an audio distribution design representative of a typical casino. It illustrates the use of various background music and paging sources distributed to four zones with SPL Computers.

Four sensing microphones, four background music/media sources and four paging sources connect to the inputs of a SymNet Express 12x4 Cobra. Routing and signal process-

ing is handled completely within SymNet before the audio is sent to the outputs.

ARC-2 Adaptive Remote Control Wall Panels connect to an ARC-PS which connects to the Express hardware via RS-485, as shown in the above sample hookup diagram. These wall panels control the music selection and volume for a given zone.

This System Diagram depicts the overall layout of an audio distribution design.

SymNet Designer Site File
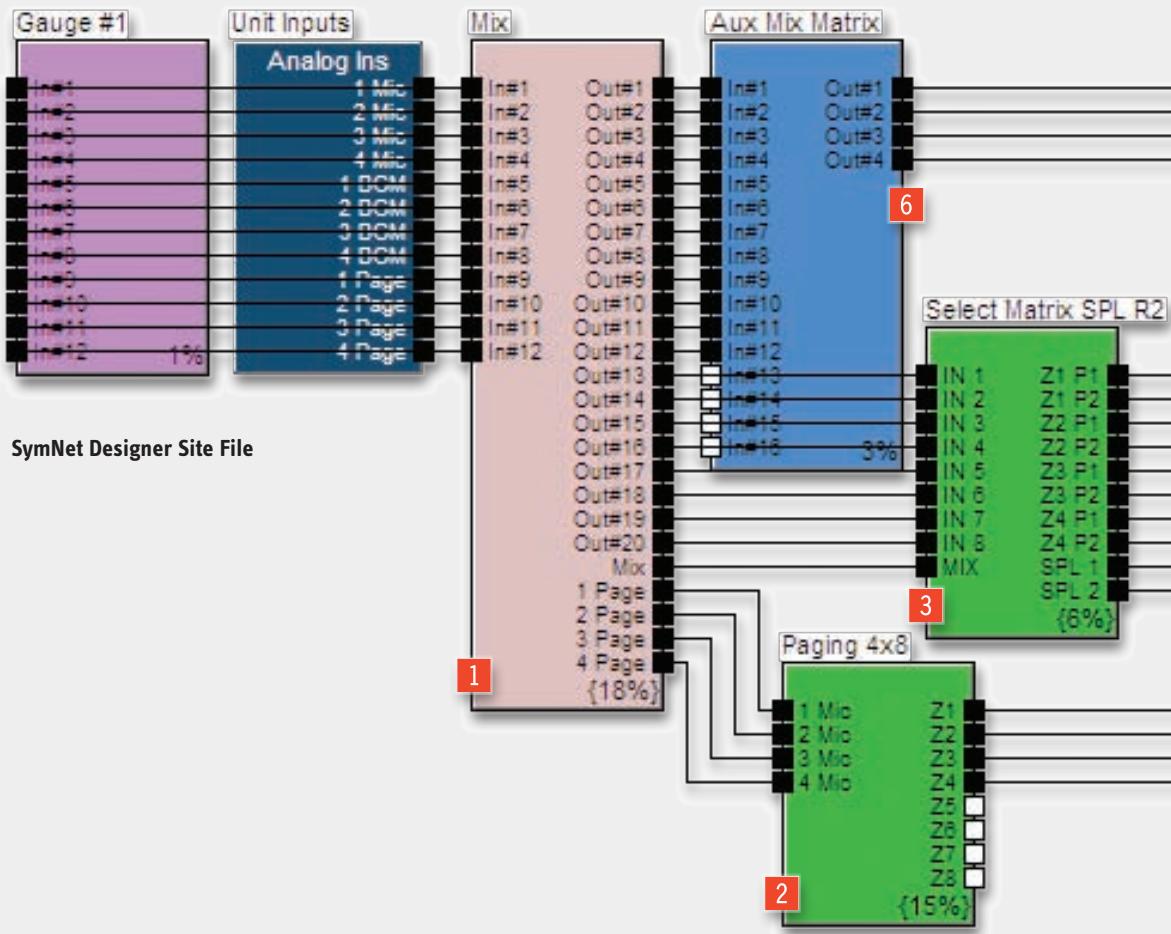
❧ Audio Distribution Design

Using SymNet Designer, open the first example Site File. Then, double-click on the Express 12x4 Cobra in the Configuration Screen to view the Design Screen. Audio enters the Analog Ins, feeding the initial gain stage. Proper gain staging is a must for a well-behaved system and signal levels should average around -20 dBFS on the meters.

1 **Mix Super-module:** Next, the audio routes through the Mix Super-module. This stage provides four bands of EQ for each microphone input and the main faders for all channels. All twelve channels exit the Super-module twice; once pre fade, or before the main faders, and once post fade, or after the main faders. A Mix output provides a single channel of post fader mixed audio.

2 **Paging Super-module:** This Super-module contains the paging logic for each zone. For more information on SymNet's paging technologies, please review the Public Address application.

3 **Select Matrix Super-module:** This Super-module provides the ability to select any of the microphone or BGM inputs as program material. Paging microphones are not available as a selectable source. Two outputs for each zone feed the Zone Routing Super-module.

4 **Zone 1-4 Super-modules:** These Super-modules create a mix for the zone output. Each Super-module has two program inputs, an aux mix input, and a page microphone input. Zones 1 and 2, detailed later, also feature an SPL Computer.

5 **Output Super-module:** Fed by each of the Zone Super-modules, this Super-module provides a matrix module which allows custom routing of any zone to any output. Loudspeaker Management modules, Gain and Metering complete this Super-module.

6 **Aux Mix Matrix:** Additionally, there is a Matrix Mixer-module that follows the Mix Super-module which is used to create unique mixes of the inputs for each zone.

Zone 1 [4]
1 Progra   Zone
2 Progra
Mix
Page
SPL   {7%}

OUTPUT [5]
In#1   Out#1
In#2   Out#2
In#3   Out#3
In#4   Out#4
        {31%}

Unit Outputs
Analog Outs
Zone 1
Zone 2
Zone 3
Zone 4

Gauge #2
In#1
In#2
In#3
In#4
        1%

Zone 2
1 Sourc   Zone
2 Sourc
Mix
Page
SPL   {7%}

Zone 3
1 Sourc   Zone
2 Sourc
Mix
Page   {4%}

Zone 4
1 Sourc   Zone
2 Sourc
Mix
Page   {4%}
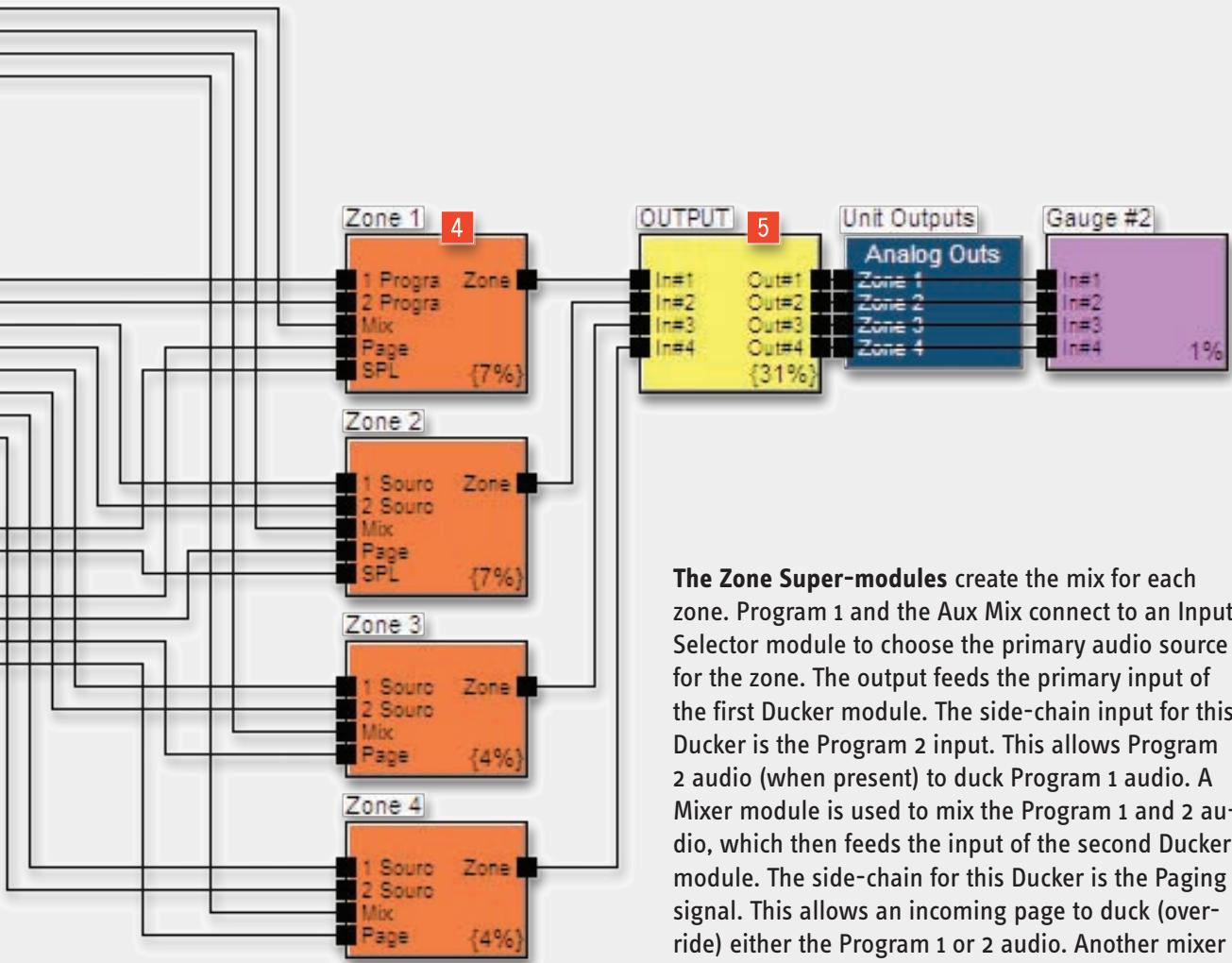
The Zone Super-modules create the mix for each zone. Program 1 and the Aux Mix connect to an Input Selector module to choose the primary audio source for the zone. The output feeds the primary input of the first Ducker module. The side-chain input for this Ducker is the Program 2 input. This allows Program 2 audio (when present) to duck Program 1 audio. A Mixer module is used to mix the Program 1 and 2 audio, which then feeds the input of the second Ducker module. The side-chain for this Ducker is the Paging signal. This allows an incoming page to duck (override) either the Program 1 or 2 audio. Another mixer is used to feed the SPL Computer modules in Zones 1 and 2. The SPL Computer modules are the Gap–sensing type. The required Sense Input is connected to a microphone that monitors the zone. Zones 3 and 4 do not have SPL Computers.

1 Program

Mix

Route or Mix
Route   Out
Mix   1%

2 Program

Duck 1
Mono Ducker
In#1   Out#1
Side   Ctrl
        1%

Mix
1 Sourc   Out#1
2 Sourc   1%

Duck 2
Mono Ducker
In#1   Out#1
Side   Ctrl
        1%

Mix
Sources   Out#1
Paging   1%

SPL
Mono Gap-sensing SP
In   Out
Sense In Control
          3%

Zone

Page

Zone Meters
In#1
In#2
In#3
In#4   1%

SPL
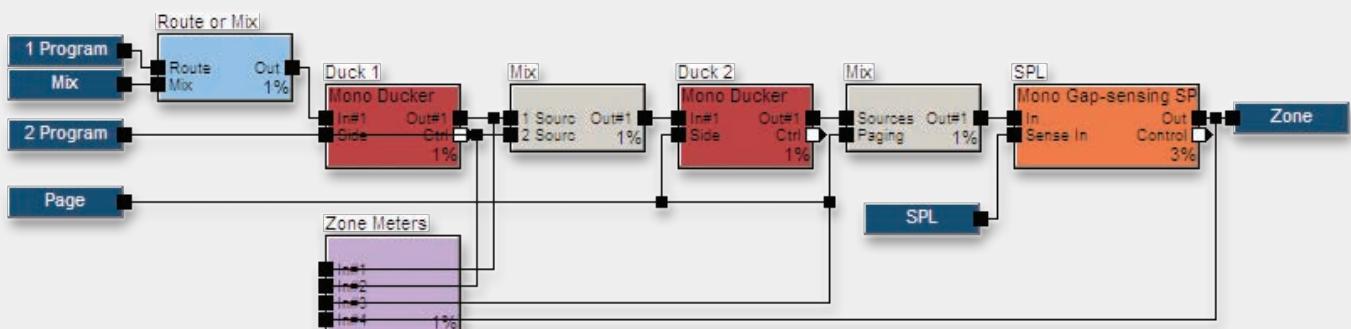
**Zone 1–4 Super Module Design View**

❧ Audio Distribution Control Screens

Main Control Screen:

There is a "Main" button on the Configuration and Design Screens linking to the Control Screen section. The Main Control Screen displays the I/O for the system from left to right and acts as the primary navigation page to view the other Control Screens.

Input Control Screen:
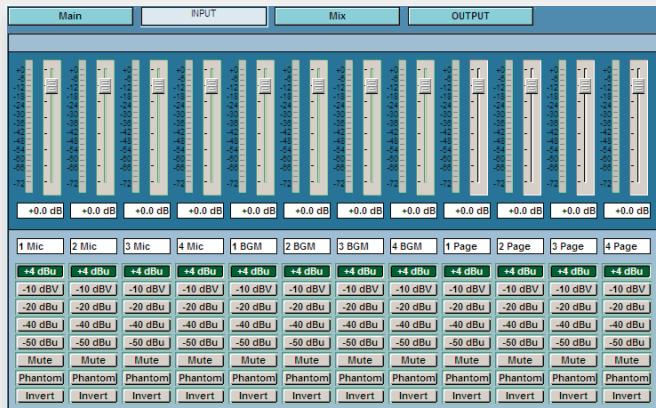


The Input Control Screen sets the initial gain for the audio signals. Phantom Power can also be turned on or off. The gain buttons should be used to "rough in" the input gain. These buttons function as an analog gain adjustment. Adjusting the input gain in the analog domain helps maximize signal to noise ratio and A/D converter resolution. The faders fine tune the input gain in the digital domain. At the input stage, audio signals should average around -20 dBFS. Furthermore, the input gain should never be set so high that the system peaks or clips.

Mix Control Screen:
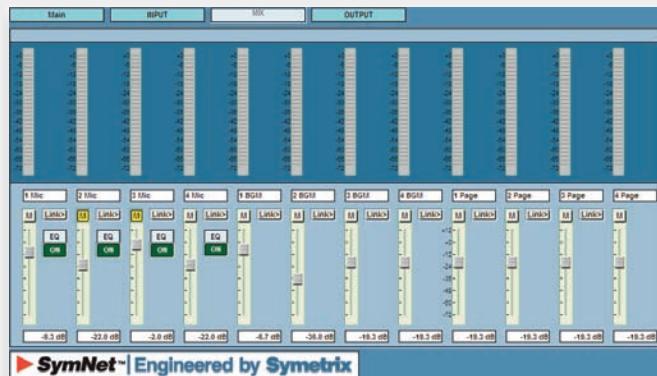
The Mix Control Screen meters the input audio before the fader stage. There are mutes and faders for every channel coming into the DSP device. Channels 1-4 also have EQ buttons that open the EQ module. An ON button engages the EQ. The Link buttons connect the volume and mute controls for adjacent channels.

Zone Super-module:
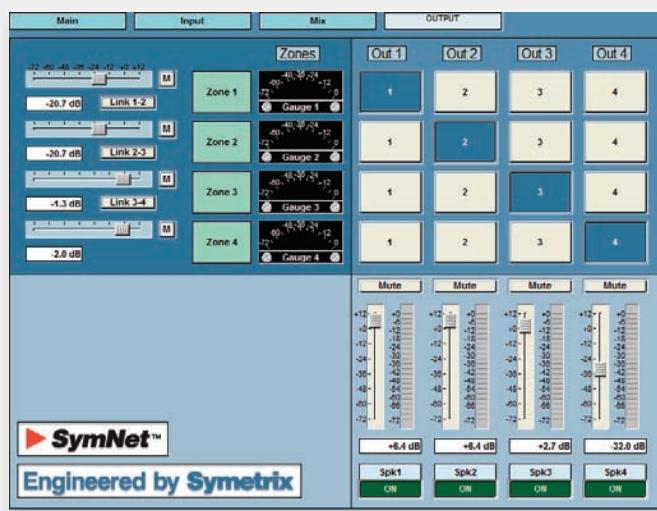
This is the Super-module Control Screen for the Zone Super-modules. Organized by inputs, each section has Fader and Mute controls plus other controls as applicable. Program 1 and 2 also has controls for Input selection, button links to the Ducker modules, and for Program 1, selection between the Program Selection and a custom Zone Mix. The Zone Out section of the Control Screen also has a button link to the SPL Computer module on Zones 1 and 2. Metering for each input is also provided.

Output Control Screen:
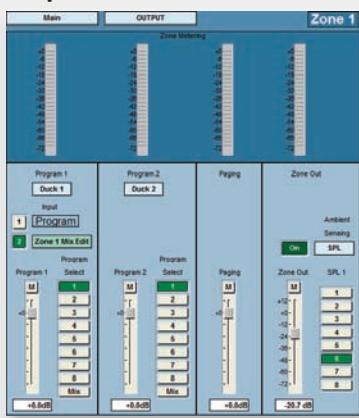
The Output Control Screen contains the main zone faders, which are a duplication of the faders on the Zone Routing Control Screen. There are 4 output faders, mutes, and meters along the bottom of the screen. The matrix allows mixing of any zone to any outputs. This provides flexibility when a single zone feeds a multi-way speaker system, for example. There are 4 SPK button links that open SymNet's Loudspeaker Manager modules which control the crossovers (filters), EQ and delay settings for each output. Finally, an ON button engages the EQ.

Audio Distribution Signal Flow
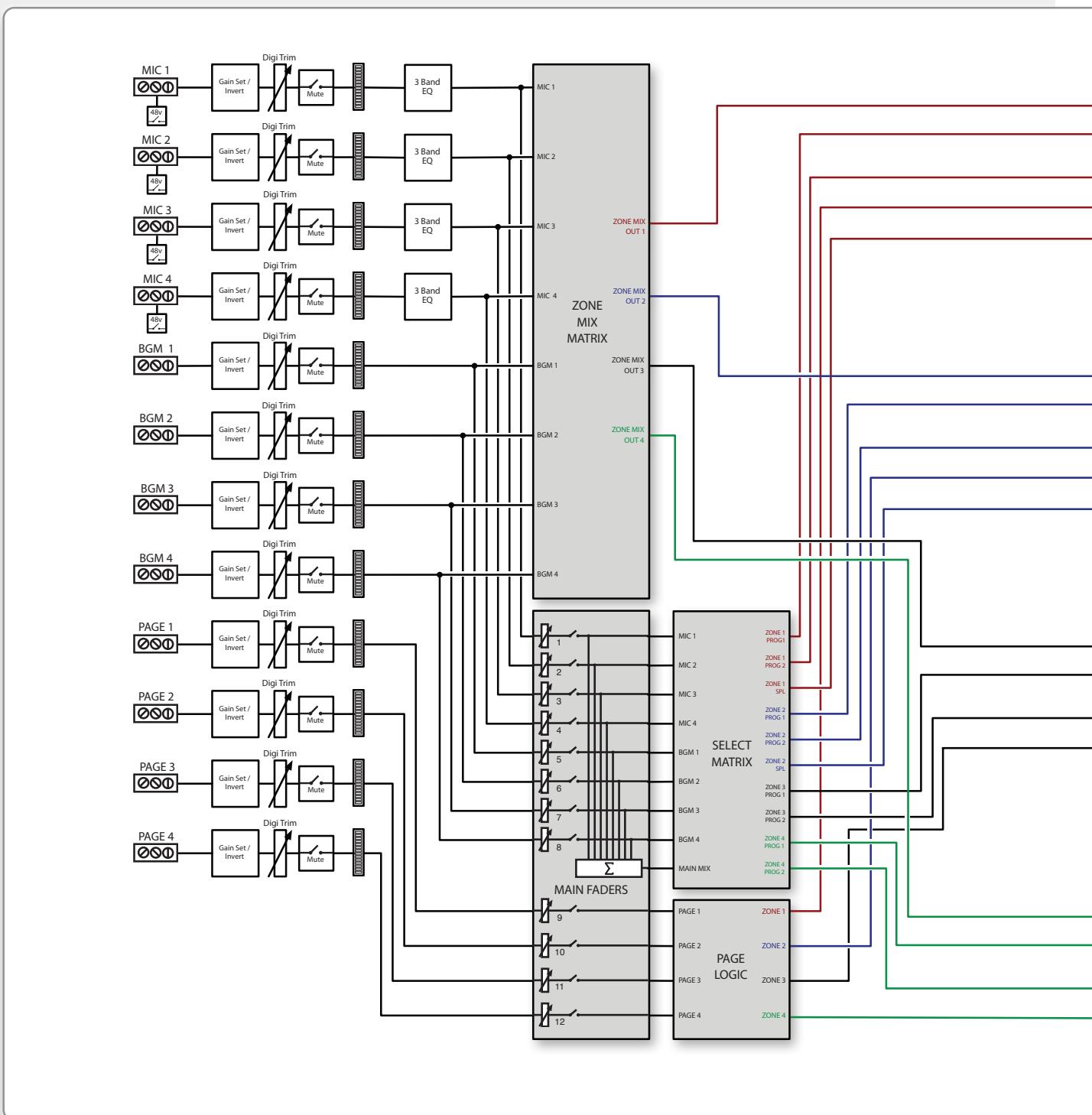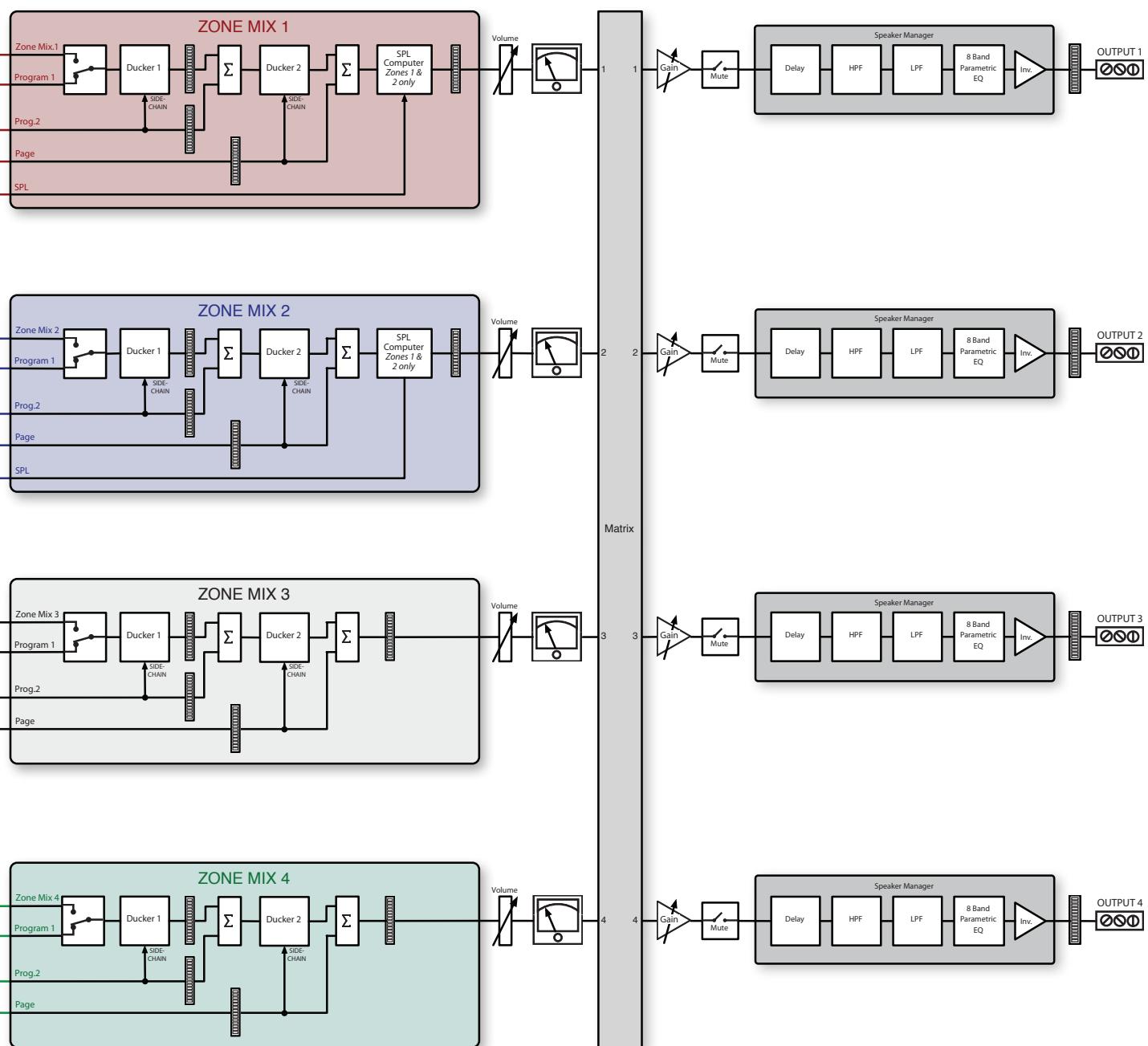
Audio Distribution System Diagram

BGM Sources in
Amp/SymNet Rack

256 SPTS 3

164 ARTN

INSERT CD

Mic/Line
Inputs 9-12

Mic/Line
Inputs 5-8

Express 12x4 Cobra

**Express 12x4
Cobra**
in Amp/SymNet Rack

Mic/Line
Inputs 1-2

CAT 5

Host Computer
running SymNet Designer

Mic/Line
Inputs 3-4
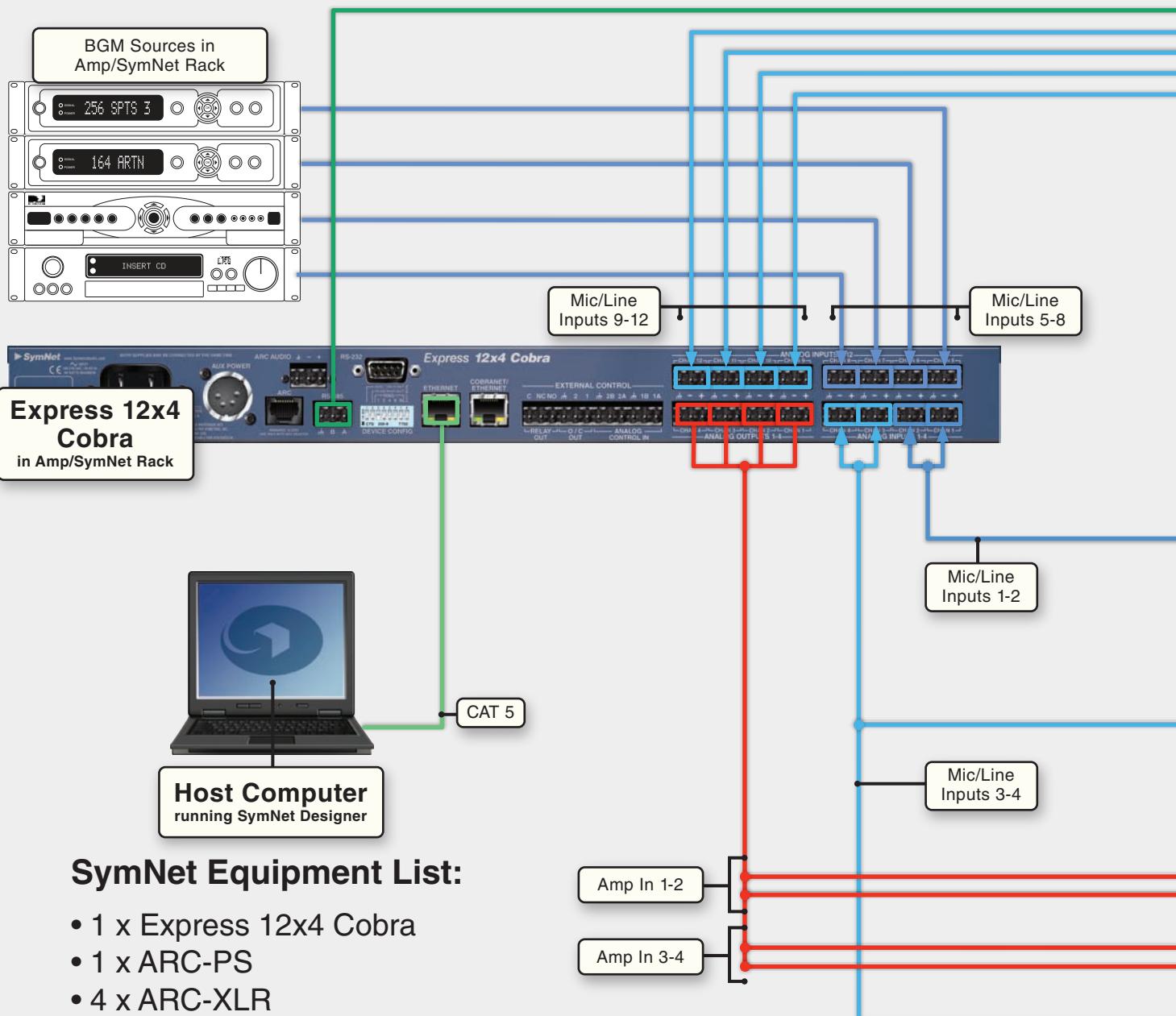
SymNet Equipment List:

- 1 x Express 12x4 Cobra
- 1 x ARC-PS
- 4 x ARC-XLR
- 2 x MS-1

Amp In 1-2

Amp In 3-4

▶ **SymNet**™

ARC-PS
in Amp/SymNet Rack

ARC-XLR
Page Station 4

ARC-XLR
Page Station 2

CAT 5

CAT 5

CAT 5

Amp/SymNet
Rack Room

SPL Computer
Sense Mics 1&2
in Ceiling Mounted MS-1s

XLR #2

ARC-XLR
Page Station 1

XLR #1

Zone Out 1

Zone Out 2

Zone Out 3

Zone Out 4

ARC-XLR
Page Station 3

CAT 5

Stereo Power
Amplifiers
in Amp/SymNet Rack
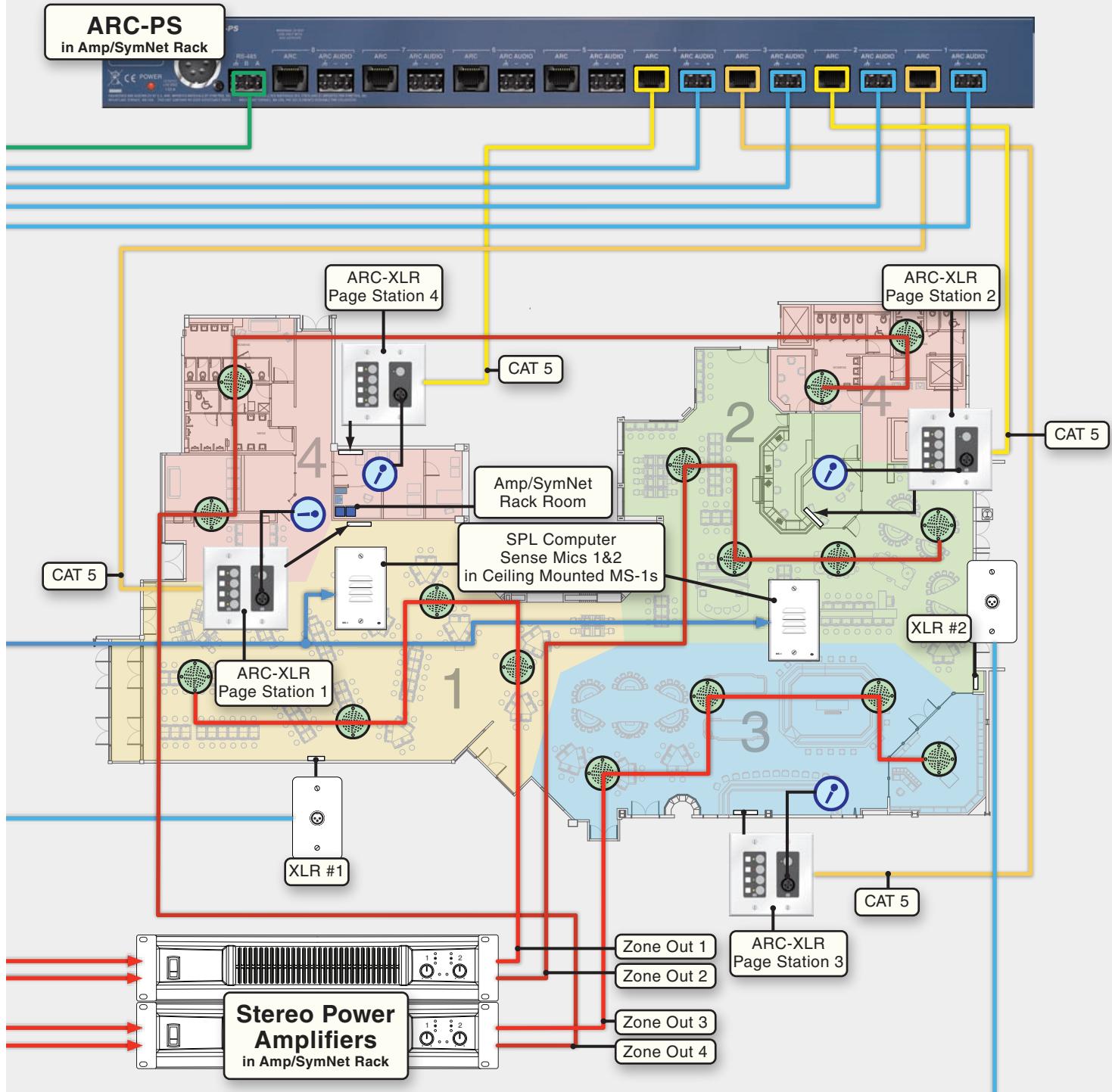
ARC-2

Adaptive Remote Control Wall Panel

The ARC-2 is a menu-driven remote control for Symetrix DSPs such as the 8x8 DSP, and the SymNet Express Cobra line (8x8, 12x4, 4x12 and 4x4). Tap into the full power of your system with twenty-four (24) menus with up to sixteen (16) items each that can be used to address multiple basic functions or initiate complex logic-based control events: gain, preset triggering, source selection, room combining and more. The 8-character backlit display supports up to thirty-one (31) scrolling characters, providing instant user feedback for control assignments, default settings, and actions. The three buttons help you navigate menus, raise or lower values, and enable or disable the remote control. All control assignments, including item labeling, parameter limits and firmware version upgrades are handled by software included with Symetrix DSP hardware. Power, control, and a single channel of ARC Audio are connected via RJ-45 inputs or screw-type barrier strips. **Intuitive Navigation:** Pressing the menu button navigates through the menu names. The menu button also acts as a preset trigger when a preset list is scrolled. The up/down arrow buttons adjust parameter settings and scroll through preset lists. Holding the menu button and using the up/down arrow keys moves you forward or backward through the menus. **Programmable Setup:** The wall panel's behavior is programmable as well. Menu brightness in "active" and "inactive" states can be set independently, so the display will "sleep" in light-sensitive environments like theaters. If the ARC-2 goes idle, it can scroll a message and return to the top of its menu tree. Upper and lower parameter limits help contain the range of adjustment and a button press lockout will prevent tampering by curious but unauthorized fingers. Available with an aluminum faceplate, ARC-2 mounts into a single gang electrical box (US).

Architect and Engineer Specifications: Adaptive Remote Control (ARC).

The series of remote control wall panels shall be designated in two groups – Menu ARC, and Modular ARC. The Menu ARC (ARC-2) shall include one 8-character backlit alpha-numeric display, one momentary button for menu selection, and two momentary buttons for value increment/decrement. The Menu ARC shall mount in a standard U.S. single-gang backbox. Power and control shall be connected via two RJ-45 connectors, or screw-type barrier-strip. Modular ARC wall panels shall consist of multiple models that mount in standard U.S. single- or dual-gang backboxes, and shall be compatible with standard Decora® faceplates. ARC-K1 shall include one push-button rotary encoder, one eight-segment LED stack, and two status LED indicators; ARC-SW4 shall include four momentary buttons with four corresponding status LED indicators; ARC-EXK shall include one push-button rotary encoder, one eight-segment LED stack, and two status LED indicators, ARC-EX4 shall include four momentary buttons with four corresponding status LED indicators; ARC-SWK shall consist of one ARC-K1 tied to one ARC-EX4. ARC-Mic shall include one onboard electret condenser microphone and one momentary push-to-talk button, tied to one ARC-EX4; ARC-XLR shall include one 3-pin female XLR connector and one momentary push-to-talk button, tied to one ARC-EX4. Adaptive Remote Controls shall function as external user controllers for Symetrix DSP systems. A designer software application shall be provided for assigning control within DSP system components. RS-485 communications shall be utilized for software control and configuration. The series of wall panels shall be CE marked, CSA tested to UL 60065. The series of wall panels shall be Adaptive Remote Control (ARC).

ARC-PS

Rack Mount Wall Panel Power Supply

The ARC-PS is a nineteen (19) inch rack-mountable power supply capable of supplying power and control over CAT5 cable to a maximum of ten ARC Wall Panels. Panels can be connected in a "star" configuration, "daisy-chain", or a hybrid of the two. RS-485 from a DSP device is connected to the ARC-PS Euroblock connector. The device includes eight (8) RJ-45 connectors for CAT5 cable, and corresponding Euroblock connectors for eight (8) discrete channels of ARC Audio.

| Specifications	
GENERAL SPECIFICATIONS	
RS-485 serial I/O	Data pass-through wired in parallel with STP cable.
ARC Cable	Standard CAT5, distance dependent upon load.
ARC output voltage	15 VDC (dependent upon power supply)
ARC maximum output current	1.3 A per port, 1.3 A total

1 **Main Power:** Accepts power from Symetrix PS-4 (included) power supply only (100-240 VAC, 50-60 Hz, 15 VDC output, 20 Watts max).

2 **RS-485:** Connects the SymNet system's RS-485 bus, wired in parallel (A to A, B to B and GND to GND) using shielded twisted pair.

3 **Remote ARCs (x8):** Distributes power and RS-485 data to one or more ARC devices.

4 **ARC Audio (x8):** Splits a single analog line level audio signal off of the ARC port. Can be wired to a line level analog input or output jack for remote audio over CAT5.

Mechanical Data		
Item	**Specifications**	**Remarks**
Space Required	1U (WDH: 48.3 cm x 10.2 cm x 4.37 cm / 19 in x 4.0 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100-240 VAC, 50-60 Hz, 15 VDC output, 20 Watts maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	2.0 kg (4.4 lbs.)	

Architect and Engineer Specifications: SymNet ARC-PS.

The ninteen inch rack-mount wall panel power supply shall provide eight ARC ports on RJ-45 connectors, eight ARC Audio ports on plug-in barrier-strip connectors, and RS-485 interface on one plug-in barrier-strip connector. The device shall function as a power supply and RS-485 data router for SymNet ARC wall panels. **The rack-mount wall panel power supply shall be CE marked, CSA tested to UL 60065.**

The rack-mount wall panel power supply shall be ARC-PS.
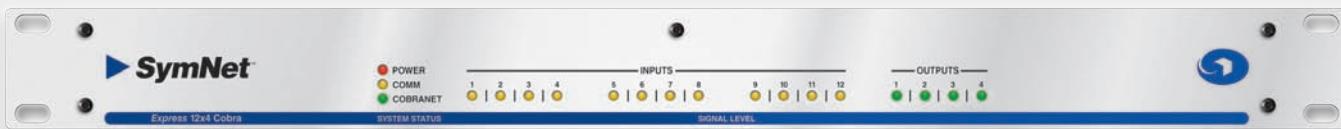
Express 12 x 4 Cobra

Express Cobra

SymNet Express Cobra is a family of 19" rack-mountable digital signal processors (DSP) that are setup and controlled by SymNet Designer software. They are ideal for audio applications such as churches, conference rooms, courtrooms, night clubs and many others. ARC Wall Panels easily integrate with Express hardware and provide simple user control of the system.

There are four analog I/O options available for the Express line: 12x4, 4x12, 8x8, and 4x4. Express devices also employ the industry-standard CobraNet® technology to share audio between devices supporting 16 inputs and 16 outputs of CobraNet audio over Ethernet in addition to the analog I/O. Express devices are intended for single device installations as well as installations with modest expansion requirements.

Devices are initially configured through the RS-232 port on the rear panel. This same port is used to connect to external control systems from AMX, Crestron, and others. Once the system is initially configured, Express devices can be addressed and controlled over Ethernet.

Any of the ARC Wall Panels can be connected via CAT5 cable to an RJ-45 jack on the rear panel. One channel of analog audio can be routed to or from the wall panel over the CAT5 cable for simple paging or monitoring needs. Express also includes an RS-485 port for extending the ARC and external control capacity.

Specifications

GENERAL SPECIFICATIONS

Processors	2 x Analog Devices SHARC 21161N @ 100 MHz SIMD
Raw processing capacity	200 MIPS, 800 MFLOPS sustained
Analog control inputs	0-5 VDC
Recommended external control potentiometer	10k Ohm, linear
RS-232 host serial I/O	115.2 or 57.6 kbaud, 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-232 accessory serial I/O	38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-485 serial I/O	38.4 kbaud (default) 8 data bits, 1 stop bit, no parity, no flow control wired in parallel with STP cable.
Ethernet/CobraNet Cable	Standard CAT5, maximum device to device length = 100 meters
ARC Cable	Standard CAT5, distance dependent upon load.
Maximum devices per SymLink Ring	1
Maximum SymLink Rings	31
Maximum stored presets	1000

AUDIO SPECIFICATIONS

Converter Type	24-bit Sigma Delta
Sampling Rate	48 kHz, +/- 100 ppm
Frequency Response	20-20 kHz, +/- 0.5 dB
A/D dynamic range	> 110 dB, A-weighted
D/A dynamic range	> 110 dB, A-weighted
Total THD+ Noise	< 0.005% @ 1 kHz, -1 dBFS
Delay memory	43 mono seconds
Input impedance	6.67k Ohms, balanced
Output impedance	204 Ohms, balanced
Maximum input level	+29 dBu with 6 dB pad, +23 dBu w/o pad
Maximum output level	+24 dBu, 100k Ohms; +21 dBu. 600 Ohms
Mic preamp EIN	-129 dBu typical, 22-22 kHz, A-weighted
Phantom power (per input)	+48 VDC, 10 mA
Input CMR	> 70 dB @ 60 Hz
Channel separation	> 100 dB, in through out @ 1 kHz

1 Main Power: Accepts power from detachable IEC power cable (100-240 VAC, 50-60 Hz, 60 Watts max).

2 Aux Power: Accepts power from Symetrix model PS-7 or user-supplied auxiliary power connection (24 VDC, 2.5 Amps, 60 Watts max).

3 ARC Audio: Splits a single analog line level audio signal off of the ARC port. Can be wired to a line level analog input or output jack for remote audio over CAT5.

4 ARC: Distributes power and RS-485 data to one or more ARC devices.

5 RS-485: Connects to a Control I/O, ARC-PS, ARC or other Symetrix SymNet family RS-485 controller, wired in parallel (A to A, B to B and GND to GND) using shielded twisted pair. Port Settings: 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.

6 RS-232: Serial communications interface for SymNet Designer on the host PC or a 3rd party accessory controller. (Mode is determined by the "RS-232: Host / Acc" mode switch.) Port Settings (Host): 115 or 57.6 kbaud, 8 data bits, 1 stop bit, no parity, no flow control. Port Settings (Acc): 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.

7 Device Config: Configures the RS-232 port mode, RS-232 port host mode baud rate and Ring Number (device address).

8 Ethernet: 10/100 Base-T Ethernet port for SymNet Designer host control over IP. IP control must be setup from SymNet Designer via RS-232 first for security.

9 CobraNet/Ethernet: 10/100 Base-T Ethernet port for CobraNet audio, 16 send and 16 receive channels. (Future software versions may support SymNet Designer host control over IP+CobraNet on this same port.)

10 Relay Out: 1 SPDT relay rated at 3 Amps, 24 VDC, resistive; 0.3 Amps, 60 VDC, resistive and can be wired normally open or normally closed. This relay can also be used for power failure detection or emergency alarm system integration.

11 O/C Out: 2 open collector outputs with a paired common ground pin. O/C outputs go low (0V) when active, and are internally pulled high (5V) when inactive and can drive external LED indicators directly.

12 Control In: 2 analog control inputs able to be used as 2 potentiometer inputs, 2 mechanical rotary encoder inputs, or as 4 switch inputs (+5 VDC reference voltage supplied).

13 Analog Outputs: 4, 8 or 12 analog line level audio inputs with individually software-selectable level of -10 dBV or +4 dBu.

14 Analog Inputs: 4, 8 or 12 analog mic / line level audio inputs with individually software-selectable phantom power and level of -50 dBu, -40 dBu, -20 dBu, -10 dBV or +4 dBu.

Mechanical Data

Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 27.4 cm x 4.37 cm / 19 in x 10.8 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100 to 240 VAC, 50-60 Hz, 60W maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	Fan on equipment right pulls hot air out of device. Air intake at equipment left. Ensure that the left and right equipment sides are unobstructed (5.08 cm, 2 in minimum clearance). The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	6 kg (12 lbs.)	

Architect and Engineer Specifications: SymNet Express Cobra.

The series of four DSP audio matrix devices shall include four different configurations of balanced mic/line inputs and balanced line outputs on plug-in barrier-strip connectors. These configurations shall be 12x4, 4x12, 8x8, and 4x4. Each shall be offered with CobraNet compatibility. Additionally each device shall include two analog control inputs, one open collector output, and one relay output on plug-in barrier-strip connectors, ARC interconnect on one RJ-45 connector, ARC Audio on one plug-in barrier strip connector, and 24 VDC backup power on one 4-pin male XLR connector. The devices shall include one RJ-45 connector for CobraNet network audio. Audio inputs and outputs shall be analog, with internal 24-bit A/D & D/A converters operating at a sample rate of 48 kHz. All internal processing shall be digital (DSP). Software shall be provided for creating/ connecting DSP system components within each hardware device. Available system components shall include (but not be limited to) various forms of: mixers, equalizers, filters, crossovers, dynamics/gain controls, routers, delays, remote controls, meters, generators, onboard logic, and diagnostics. Ethernet or serial communications shall be utilized for software control and configuration. After initial programming, processors may be controlled via dedicated software screens, third-party RS-232 control systems, and/or optional analog or RS-485 remote control devices. A designer software application shall operate on a Windows computer, with network card installed, running Windows® 98/2000/XP. **The DSP series shall be CE marked, CSA tested to UL 60065.**

The DSP series shall be SymNet Express Cobra.

Tempest Controls Casino with SymNet

Ocean Shores, Washington:

Over the last several decades, casinos across the country have become much more than just a place to visit for a day to play poker or slots. Today's casinos offer a total experience, complete with on-site hotels, spa services, live entertainment, special function halls and, of course, the latest audio technologies.

When Quinault Beach Resort & Casino ("Casino") in Ocean Shores, Washington needed to upgrade the processing for their building-wide sound system, they turned to Symetrix' SymNet Networked Audio Solution and the design/build firm Tempest Technologies, LLC in nearby Issaquah, Washington (located in the greater Seattle area). "The client had called Symetrix looking for a referral. Since we are a reseller for Symetrix in the same geo-

graphical area, we got the call," said Debbie Williamson, director of sales and marketing for Tempest Technologies, LLC.

The Casino was looking to replace its processing system and mixers that were installed circa 1998 and were no longer supported by the manufacturer. Considering the rapid pace of audio technology advancements, the Casino wanted the firm to look at their audio wish list once more with a fresh eye to ensure they were making the proper decision. "Using our recommendation and design process, we were happy to confirm that Symetrix offered the perfect solution for their needs and budget," added Williamson.

The Tempest Technologies, LLC team chose Symetrix' SymNet platform as a means to both maintain the current functionality, as well as expand the Casino's audio capabilities. "Being analog, the old system was very manual," said Mark Scuka, director of applied technology for Tempest Technologies, LLC. Scuka has completed training with Symetrix and is well-versed in the SymNet product line. "The Casino wanted more control points than before and more automation of features."

The audio processing includes 26 zones of audio across the facility, including the main Casino floor, the Great Hall, the Poker Room, the lobby, an indoor pool, the Grand Entry, the Bistro and multiple other indoor and outdoor public areas. For the Great Hall banquet rooms, there was

also the need to room combine, in any configuration, up to six rooms. On top of that, the facility is open seven days per week from 17 to 20 hours a day, so it was imperative that the system was down for as little amount of time as possible. As such, Scuka took advantage of his ability to complete the programming upfront, prior to the installation date. He added, "We installed SymNet hardware mostly at night during off-peak periods. The system was down for less than 48 hours total since the program was designed and tested in our office."

To handle the Casino's current and future requirements, Tempest Technologies, LLC installed three SymNet 8x8 DSP boxes, along with three SymNet BreakIn12 A/D input devices and three SymNet BreakOut12 D/A output devices. Since the BreakIn/Out boxes have no DSP processing onboard, they are a cost-effective option that can take full advantage of the processing power in the 8x8 DSP box.

Scuka noted, "The transition of analog to digital was very easy for them. They wanted to be hands-off as much as possible. Therefore, we gave them basic controls using SymNet ARC-2 wall panels and AMX touch panels."

The thirteen ARC-2 panels were connected in the same places as the old wall plates, with a new CAT5 cable run to each location. Using the new ARC-2 wall panels, the Casino has access to up to 24 menu items, each with 16 sub-menu items - to functions like volume, preset recall,

and room combining. In addition, Tempest Technologies, LLC also set the correct system limits so that a Casino employee cannot accidentally max out the system and send it into feedback. One SymNet ARC-MIC wall panel with enclosed condenser microphone and two SymNet ARC-PS rack-mount power supplies for ARC wall panels were also installed.

In the Casino games area, visitors can play 350 electronic gaming devices like slots and electronic poker, 15 table games, and Keno - all of which can make for a challenging listening environment. Scuka programmed the SymNet system using the ambient noise compensation features to ensure a harmonious balance between game playing and paging or background music. A microphone with input to the SymNet system was installed on the casino floor to monitor the ambient noise level and adjust the sound system accordingly within preset levels. "Although the microphone input checks SPL levels and adjusts the system, the Casino also has individual control over each zone," said Scuka.

The Casino also picked up the CobraLink option so Tempest Technologies, LLC could remotely update the programming, if necessary. "Any issues can be addressed quickly rather than waiting for a service technician to arrive on-site," said Williamson. "Overall, this system is very scalable so it can grow along with them."

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